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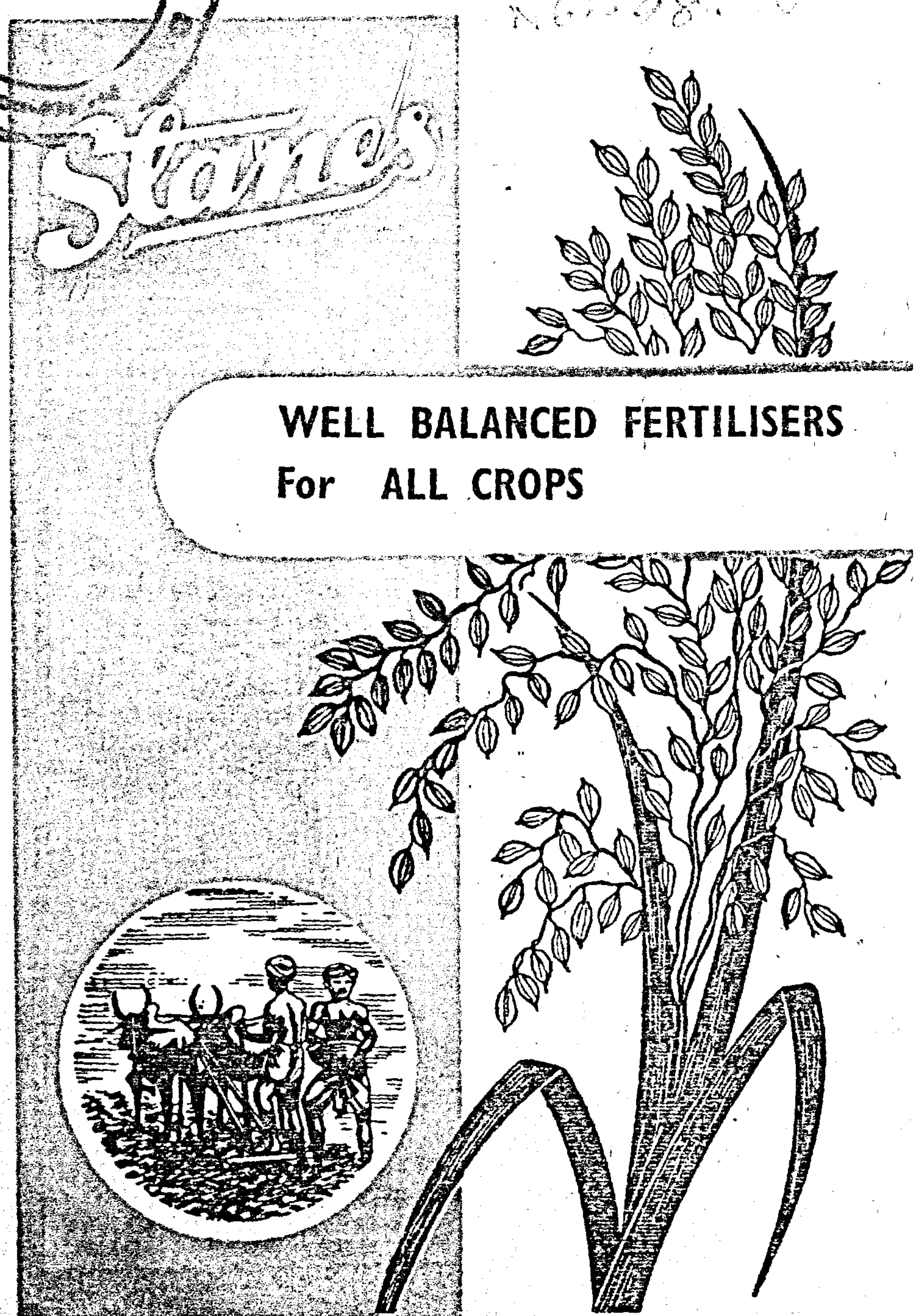

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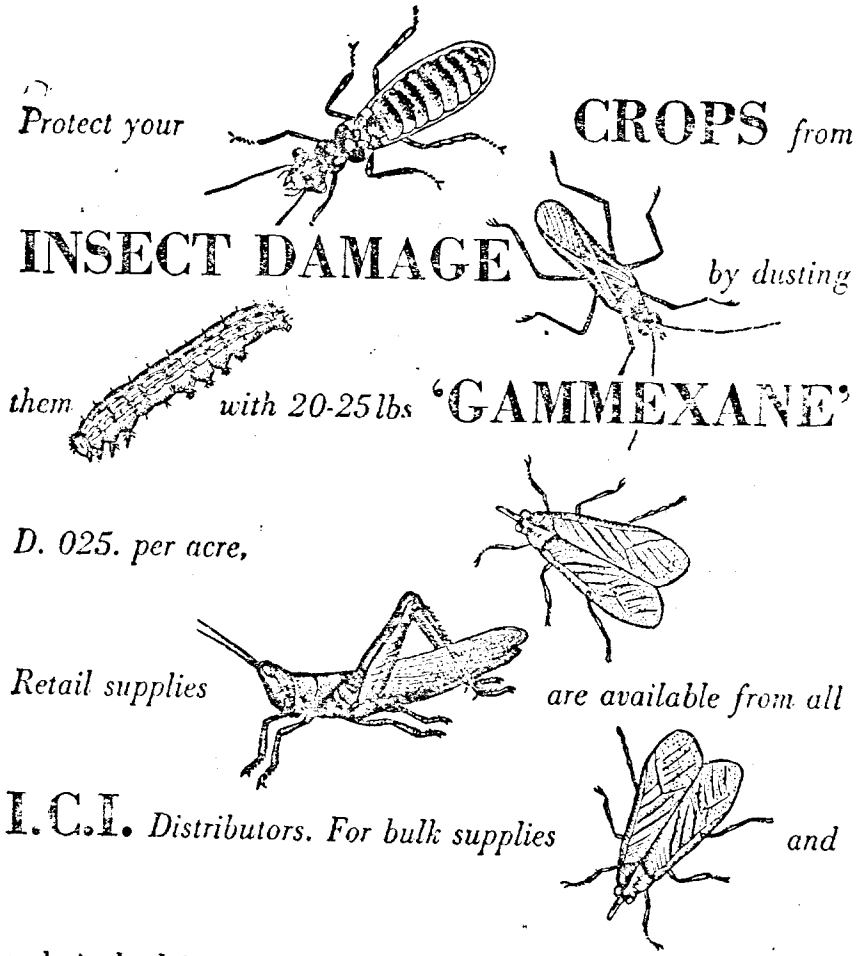

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The Madras Agricultural Journal

Vol. XLVIII October 1961 No. 10

Editorial 117

An important feature for economic growth is in the proper integration of agricultural and industrial sectors. Perhaps, the character of our population which is predominantly agrarian, conditions of food deficits and the lags in supply of industrial raw materials would, in the path of economic expansion, call for greater emphasis on the development of agricultural sector. Industrial growth complements and aids the technological revolution in agriculture and receives in turn, a fillip for accelerated growth from agriculture as in the case of cotton and sugarcane.

While capital and technology are considered pivotal for economic development, the relative response in the agricultural and industrial fields, determines the goals and the means and tempo of accomplishment in the long run. In 1960–'61, the industrial production stands at 94 percent over 1950–'51 and agricultural production registers an increase of 41 percent. Agriculture in India has scope for high productivity. The use pattern of resources and man power in agriculture, when adjusted to the optimum, will encourage further growth of technology.

At present, unemployment and under-employment prevent higher income opportunities and capital formation to an appreciable degree. In this problem too, integration of agriculture with industrial development has a vital role to play. Excessive population dependent upon agriculture could be siphoned off by the employment opportunities released by the industrial sector which is no less dependent on agriculture for raw materials. The work projects, small scale industries and intensive and extensive cultivation programmes could slove under-employment in agriculture to a fair degree.

The investment programme seeks to raise the rate of net investment from 11 percent of national income at present, to 14 to 15 percent by the end of the Third Plan, 17 to 18 percent by the

Fourth Plan and 19 to 20 percent by the Fifth Plan. In the Third Plan, an additional employment of 14 millions of which 3·5 millions in agriculture and 10·5 in industry is envisaged. Balanced development by maximising the resources and its efficient utilization in the agricultural and industrial sector is a sure road to progress.

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Studies on the effect of plant growth regulators on Tobacco

by

K. G. SHANMUGAVELU

Introduction : Hitchcock (1935) found that application of indole propionic acid in lanolin paste (50 mg/gm.) to cut surface of decapitated tobacco stem inhibited the growth of terminal bud but stimulated the growth of buds in the middle and lower parts of the stem. Hitchcock and Zimmerman (1935) reported that the addition of 1 to 8 mg., per pot, of aqueous solutions of indole acetic acid, indole propionic acid, naphthalene acetic acid, phenyl acetic acid and phenyl propionic acid caused permanent swelling and bending of the stem. They (1942) found that when tobacco plants were sprayed with 300 p. p. m. of napthoxy acetic acid, there was rapid growth of the plants, as compared to the check plants. When plants were treated with 200 p. p. m. of chlorophenoxy acetic acid, some formative effects were observed by them. According to McEvoy (1942) application of 2·5 p. p. m. of indole acetic acid at the rate of 250 ml. per sq. ft. was beneficial in stimulating the growth of tobacco plants. Liguori and Martino (1953) reported that the proprietory root promoting substances Rootone, Aumentone and Transplantone, when used for treating the beds of Turkish tobacco, there was slight reduction in the germination percentage, but the plants arising from Rootone-treated seeds showed better development than the control.

With a view to examine the effect of some plant growth regulators on tobacco, studies were undertaken in the Department of Agriculture, Annamalai University, Annamalainagar and the results are presented here.

Materials and Methods : Local chewing variety of tobacco *(Nicotiana tabacum* L.*)* was selected for these studies. Good quality seeds were collected and were soaked for 24 hours in 20 p. p. m. and 30 p. p. m. of aqueous solutions of indole acetic acid (IAA), indole butyric acid (IBA) and naphthalene acetic acid (NAA). Two grams of seeds were used for each treatment. After treatment the seeds were sown in raised nursery beds in the Pot Culture House. Germination counts were taken after an interval of seven days. The plants of uniform size arising from each of the treated beds were pulled after seven weeks and were transplanted in twelve-inch pots. Observations on the growth rate and other characters of these plants were recorded at periodical intervals.

To study the effect of spray treatment with plant regulators on tobacco plants, seven week-old healthy seedlings from untreated seeds were selected and planted in twelve-inch pots. After an interval of seven days the plants were sprayed with aqueous solutions of 50 p. p. m. of the plant growth regulators. Ten plants were included under each of the treatments. The plant height and length and breadth of the leaves were measured at periodical intervals. The leaf area was calculated using the formula $2/3 \times l \times w$, where l is the length and w is the width of the leaf, as recommended by Sajnani and Dhyani (1959). Representative samples of five leaves, selected at random from each of the treatments, were collected and the average wet weight was taken. The dry weight of the leaves was obtained by keeping them in hot air oven at 100° C until a constant weight was obtained.

Results: *1. Effect of seed treatment with plant growth regulators:* The tobacco seeds were treated with plant growth regulators for 24 hours as per details given above. The germination counts taken after seven days from the various treatments are recorded in Table I.

TABLE I.

Effect of Growth Regulators on Seed Germination.

	IAA		IBA		NAA	
Conc. in p. p. m.	No. of seeds germi-nated	% increase over control	No. of seeds germi-nated	% increase over control	No. of seeds germi-nated	% increase over control
20	...	...	1434	693·2	392	102·4
30	801	312	1553	700·5	480	147·4
0 (control)	194	...	...	...	...	...

These results indicate that in all the treatments there was more germination than in the control. The increase in germination percentage ranged from 102·4 to 700·5 over control, of which IBA at 30 p. p. m. gave the maximum of 1553 seedlings as compared to 194 seedlings in the control.

The results obtained on the rate of growth of the plants arising from the treated seeds are presented in Fig. 1. All the treatments seem to induce faster growth of the plants as compared

to the control. The percentage increase in the height varied from 25·3 to 59·1 by the end of 49 days after transplanting; the percentage increase in the leaf area also varied from 22·5 to 50·1, IBA at 30 p. p. m. being the best among the various treatments.

With a view to find out whether the increase in size of the plant is commensurate with the wet and dry weights of the plant, the samples were weighed as per details given under Materials and Methods. The results obtained are presented in Table II.

TABLE II.

Effect of Growth Regulators on dry and wet wt. of leaves after pre-treatment of tobacco seeds.

Treatment	Average wet wt. of the leaf (gms)	Average dry wt. of the leaf (gms)	Percentage moisture
IAA 30 p. p. m.	14·949	1·266	91·4
IBA 20 „	12·506	1·126	90·9
IBA 30 „	13·921	1·280	90·8
NAA 20 „	13·244	1·266	90·4
NAA 30 „	14·287	1·458	89·8
Control	14·466	1·435	90·02

As could be seen from the data obtained, there is no significant variation in the moisture content of the leaves from various treatments.

2. Effect of plant growth regulator sprays on tobacco: Potted tobacco plants, seven days after transplanting, were sprayed with aqueous preparations of plant growth regulators using an atomiser. Periodical observations were taken and the rate of growth, area of the leaves etc., as well as malformations or formative effects, if any, were observed. The details on growth rate and leaf area of the plants are presented in Fig. 2.

The results clearly indicate that there is relatively more growth in all the plants sprayed with plant growth regulators, reaching upto 21·8 per cent increase over control, after 28 days. The leaf area of the sprayed plants, however, was not increased in all cases; in the

cases of 50 p. p. m. of chlorophenoxy acetic acid (ClPA) and 2,4-D there was reductions in the area — these reductions were mainly due to formative effects caused by the chemicals. Though there has been slight increase in the leaf area due to the treatments with 2,4,5-trichlorophenoxy acetic acid (2,4,5.T), NAA and IBA at 50 p. p. m., this increase in the area was not uniform in all the leaves. The various types of formative effects observed in the treated plants are presented in Fig. 3 (A to D).

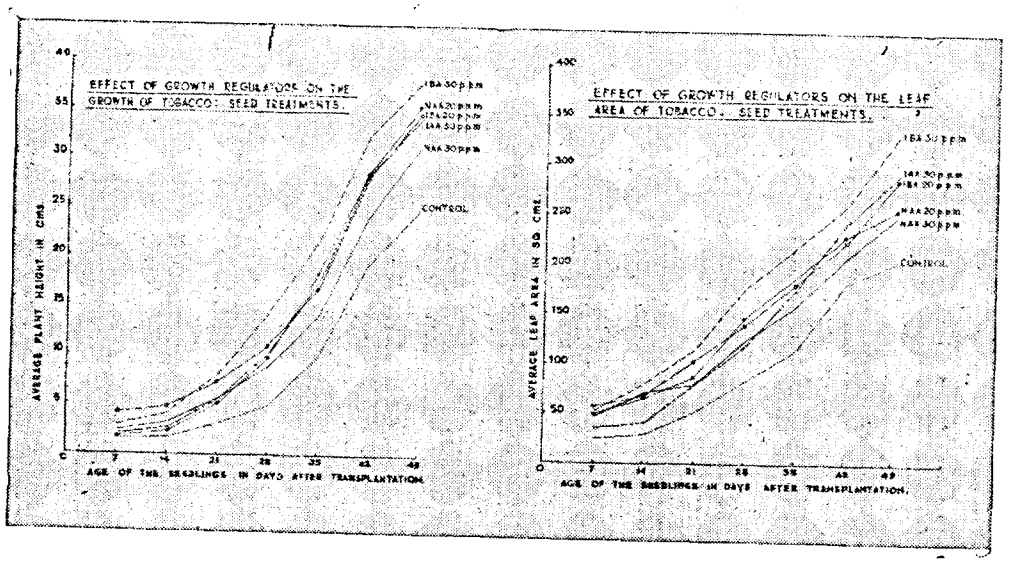

Fig. 1.

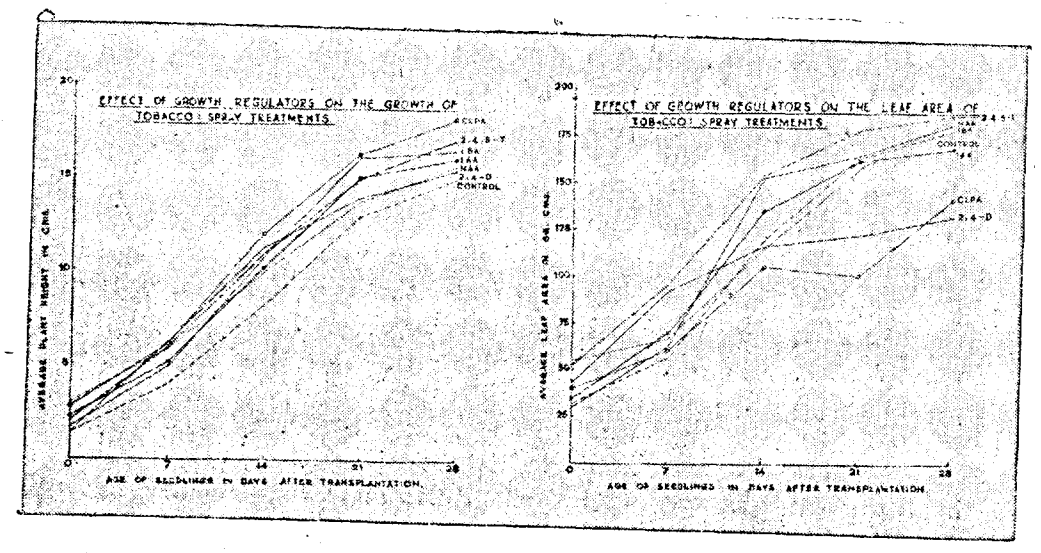

Fig. 2.

In order to compare the wet and dry weights as well as moisture percentage of the leaves, samples were collected and weighed as per the details mentioned earlier. The results are summarised in Table III.

Table III.

Effect of Growth Regulators on dry and wet weights of leaves after spraying.

Treatment	Average wet wt. of the leaf (gms)	Average dry wt. of the leaf (gms)	Percentage moisture
IAA 50 p. p. m.	17·806	1·040	94·10
IBA 50 ,,	13·570	1·153	91·50
NAA 50 ,,	11·820	0·914	89·70
2, 4, 5-T 50 ,,	12·950	1·230	90·50
2, 4-D 50 ,,	14·460	1·470	89·80
CIPA 50 ,,	13·570	1·070	92·10
Control	17·690	1·585	91·01

The moisture percentage seems to be slightly more in the case of plants treated with 50 p. p. m. of IAA, while in other cases there has been a slight increase or reduction in the moisture content.

Discussion: In the present studies significant increases in the germination percentage of the seeds treated with plant growth regulators were obtained. Also the plants arising from the treated seeds were found to be more vigorous than those of the control, indicating thereby that the chemicals could be used with advantage for pretreating the seeds. Liguori and Martino (*loc. cit.*) in their studies with three proprietory plant growth regulators found that there was reduction in the germination percentage, but the ones arising from the treated seeds developed better than the control after one month. In the present studies it was found that 30 p. p. m. of IBA and 20 p. p. m. of NAA induced faster growth of the seedlings.

The spray treatments with the various plant growth regulators though increased the height and in some cases the leaf area, there has been formative effects to a lesser or greater extent, indicating thereby the harmful effects of the chemicals on tobacco plants,

at the concentrations tested. Hitckcock and Zimmerman (1942) have reported on the formative effects caused by the application of (200 mg. / *l*) or C*l*PA to tobacco plants. The formative effects obtained in the present studies with the same chemical by spraying at a concentration of 50 p. p. m., not only reduced the leaf size as seen in the figures given by the authors (*loc. cit.*), but also more intense and virus-like malformations were observed on the leaf. The formative effects caused by the chemicals on tobacco leaves seem to vary with the chemicals (Fig. 3).

Tobacco being a crop cultivated for its leaf, any increase in the yield as well as in the average leaf area without affecting the quality would be most welcome. In the present studies in has been clearly indicated that by the seed treatments better plants with larger leaves could be obtained without much affecting the moisture content of the leaves, whereas by the spray treatments there may be either increase or reduction in the leaf area by the quality of the leaf may be affected either due to the formative effects or due to the changes in moisture percentage.

Summary : The effect of plant growth regulators on tobacco was tested by pre-treatment of seeds as well as by spray treatment of the potted plants. It was observed that IAA at 30 p. p. m., IBA at 20 and 30 p. p. m. and NAA at 20 and 30 p. p. m. gave increased thereby the harmful effects of the chemicals on tobacco plants,

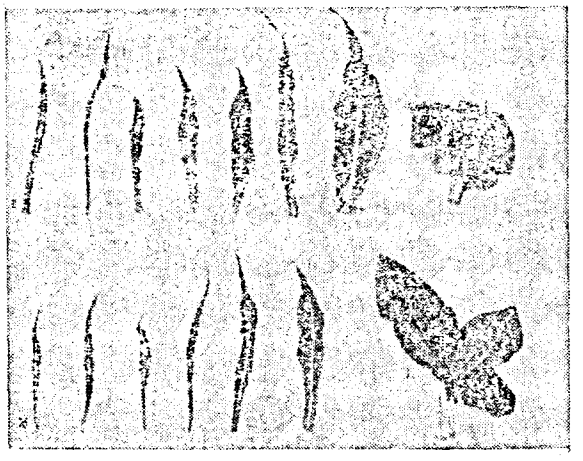

FIG. 3-A.
The Formative effects produced by C*l*PA. at 50 ppm.
(Various leaf modifications).

FIG. 3-B.
Cup-like malformations of terminal leaves due to C*l*PA. sprays at 50 ppm.

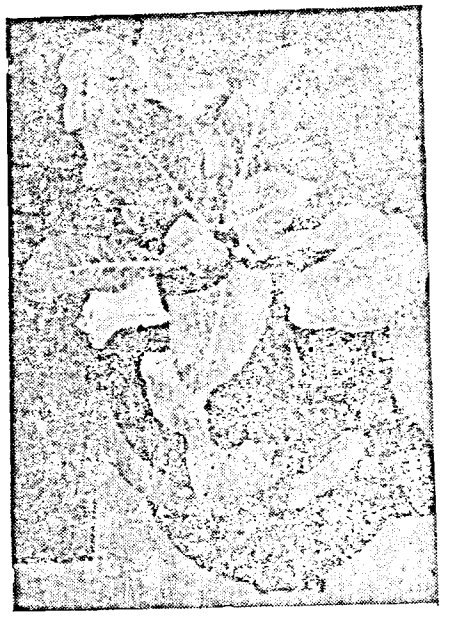

FIG. 3-C.
Malformations of the leaves caused by the spraying of 2, 4-D at 50 p.p.m.

FIG. 3-D.
Virus-like symptoms caused by C*l*PA. sprays at 50 p.p.m.

germination of the seed, better growth, and more leaf area of the plant. The increase in germination percentage ranged from 102·4 to 700·5, the percentage increase in height ranged from 25·3 to 59·1 and the percentage increase in leaf area from 22·5 to 50·1, after 49 days 30 p. p. m. of IBA giving the best results.

Six plant growth regulators at 50 p. p. m. were sprayed on seven week-old potted tobacco plants. Though certain increases in the height and leaf area could be obtained, all the chemicals caused formative effects to a lesser or a greater extent.

The moisture percentage of the leaves obtained from the plants arising from pre-treated seeds was almost the same as that of the control whereas the leaves obtained from the sprayed plants gave varying results.

Acknowledgment: The author wishes to express his deep sense of gratitude and sincere thanks to Dr. G. Rangaswmi, B. Sc. (Ag.), Assoc. I. A. R. I., Ph. D. (Rutgers), F. A. Sc., Professor and Head of the Department of Agriculture, Annamalai University, Annamalainagar, under whose valuable guidance the study was undertaken.

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Some Details in the Preparation of District Vegetation Maps in India at 1 : 253,440 Scale According to the Method of Gaussen.

by

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The vegetation mapping by Gaussen's method has been already explained by Gaussen himself (1957) and later by Legris and Viart (1959). The method explained by them is for the preparation of International Vegetation map at 1 : 1000,000 scale. The purpose of this paper is two show how this method of mapping can be applied for the establishment of the district vegetation maps in India at 1 : 253,440 scale. The procedure given below was successfully followed for the preparation of the vegetation maps of South and North Arcot districts (Dabholkar 1960).

The essential features to be represented on the map: In the preparation of these types of maps, it is necessary to collect the following information:

1. Ecological conditions of the region.
2. The structure, physiognomy and the floristic composition of the vegetation.
3. The succession of vegetation.
4. Data on Agriculture and Irrigation.

The ecological features which are studied are temperature, rainfall, rainy days, humidity, xerothermic indices, light and the soils and these factors are extensively discussed already (Gaussen 1957). It is intended to explain here the actual method to be followed for the study of the vegetation and its representation on the map.

The preparation of the Skeleton Map: There is some information which can be gathered from the survey maps of India at 1" : 1 mile or 1 : 63,360 scale. The information available from such maps is very important. Recently, most of the maps have been modified and can give the latest information about the boundaries of forests, the tanks, the irrigation etc. The above maps are therefore reduced to the required scale as needed and the necessary data are obtained. After preparing such map which can be called as "Skeleton Map", the vegetation, soils, climate and the latest irrigation systems can be represented on it. For the field study therefore, the copy of the

"Skeleton Map" is taken along with the touring officers map of the district under study. Both these maps can be taken useful for locating the different vegetation types on the spot.

The study of the vegetation and its representation on the map: There are two types of vegetation viz. Natural and the Introduced. Natural vegetation consists of forests which are to be studied actually in the field. Information on Introduced vegetation can be obtained from the Agriculture and Forest departments of the districts concerned.

Natural vegetation: Many methods can be utilized for the study of the vegetation. For the present work, the following method has been used for the study and to classify the plant communities.

First of all, several traverses are made. A general reconnaisance survey is carried out first in order to distinguish as many types as possible. This is followed by traverses in selected areas when the dominants and the stratification are studied. In the third, stage, quadrates are laid out and a floristic estimate in made. The structure and the physiognomy of the forests also are then studied. With this data, the plant communities are delimited. The complete details of this method would appear elsewhere.

The next step is to study the succession of vegetation in the region to know the climax vegetation. Once the present state of vegetation, the successional stages and the climax vegetation are known, then the natural vegetation is represented on the map as follows:

As the existing stages of vegetation are the stages leading to the climax vegetation, they are marked by the stage numbers say from 0 to 10 i. e. from bare soil to the climax vegetation. On the map therefore, these numbers are shown. Physiognomy of vegetation can be shown by any symbol but the following symbols which are utilized in the International vegetation map of South India (Gaussen *et al* 1960) will serve as the best examples.

Grassland ... Fine dots

Scrub.....Oblique lines

Woodland scrub.....Oblique lines and circles

Woodland Savannah.....Circles and fine dots.

Forest..... ..Full colour

The map thus drawn shows only the condition of the vegetation but does not represent the environmental conditions of the vegetation. The ecological conditions are therefore shown by the colours as explained by Gaussen *(loc. cit)*. The climax community is shown by full colour while the degraded forests are indicated by faint colours.

Introduced vegetation: The available information about the agriculture in the regions is in the form of statistics which is district-wise and it can be represented on the map.

The statistics are about the cultivated areas, areas under the forests, fallow lands and uncultivated lands. Similarly, the statistics about the individual crop in the district is also available from the agricultural department. This information is very general and can be useful for the preparation of the general vegetation map (or the International vegetation map at 1:1000,000 scale as called by Gaussen).

For the preparation of the vegetation map of a district at 1:253,440 scale, it is extremely necessary to collect more information on the Introduced vegetation. Up-to-date statistical data on agriculture is available only from the heads of the taluks. Agricultural demonstrators also have information on agriculture in their areas but they are in charge of small divisions in the taluks and one can find that in one taluk there might be two or three demonstrators and therefore, it is difficult to collect the statistics from all these people. So the statistics on agriculture is collected from the taluk heads.

The representation of this data on the map is done as follows:

Area under Forests ..... F
,, ,, Cultivation C
,, Non-cultivated .... U
,, under Permanant pastures ..... ⊤

The above statistical data viz. CF ⊤ U for the district are shown by means of the same letters and size and style of each letters gives the percentage of each. Suppose, for a taluk, out of the total geographical area the forests form 50 %, cultivated areas 25 %, permanant pastures 20 % and non-cultivated areas 5 %, then this data can be represented as: CF ⊤. Similarly, the area under each crop such as paddy, millets, groundnut, sugarcane etc. can be shown in the same way.

For the actual indication of the different main crops, talul agricultural demonstrators and plant protection officers are consulted Plant protection officers are especially well informed in this regarc and can give the accurate demarcation of the different crops. Thi: data are finally put in the form of different symbols having definit statistical values as given below :

Paddy	⊐	Each sign represents 1000 hectares
Millets	·:·	,, ,, ,, ,, ,,
Groundnut	≈	,, ,, ,, ,, ,,
Sugarcane	7	,, ,, ,, ,, ,,

These signs are also shown by different ecological colours based on whether the crop is wet or dry. For example, paddy and sugarcane are generally wet crops and can be shown by different shades of blue colour while the dry crops such as groundnuts and millets are shown by red colour. Apart from the cereal crops, there are some trees planted for the fruits, fuel or timber in some places. The plantatian of these trees is shown by the horizontal lines using the ecological colour of the tree species.

The coloured vegetation maps of South and North Arcot districts in Madras State prepared in this way cannot be included in this paper. These maps will be published shortly and can be available to the agriculturists.

In conclusion, it can be said that if the vegetation mapping is to be undertaken in India, it should be borne in mind that the maps should be prepared for each district at 1 : 253,440 (1" : 4 miles) scale, as it is rather easy to obtain all the data on the vegetation from each district as shown in this paper.

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Soil Survey of the Amaravathy Reservoir Project Ayacut Area, Coimbatore District.

by

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(Agricultural Research Institute, Coimbatore)

Introduction : A scheme for " Post irrigation soil survey " in the Amaravathy Reservoir Project ayacut area was ordered by the Government of Madras in early 1959. Results of some preliminary soil studies conducted during the first year of the scheme are reported and discussed in this paper.

General Description of the Area : *Location and Extent :* The ayacut area is 21,500 acres distributed equally between the taluks of Udumalpet and Dharapuram in Coimbatore District. The main canal runs on the contour and the irrigated areas lie between the canal and the river. The irrigated area consists of 3,000 acres of sugarcane, 1,000 acres of paddy and 17,500 acres of dry crops such as cholam and cumbu.

Physiography : The topography is slightly undulating and rolling with a general fall in level towards the river. Several drainage rivulets cut the ayacut area and flow in the valleys to the river. These streams rise in floods during the rainy months.

Geology and Climate : The parent material of the soils of the ayacut area has been derived from the gneisses of the archean age. In Udumalpet taluk the geneiss is mostly feldspatic while in Dharapuram taluk it is hornblendic in character. The parent material in Dharapuram taluk is calcareous in general. The area has an average annual rainfall of about 20", the rains falling mostly in North East monsoon season.

Agricultural history and statistics : Cholam is the most important crop in the area followed by ragi and groundnut. Paddy and sugarcane are the most important wetland crops. The average per acre yield of paddy is about 2,500 lbs and that of sugarcane is about 25 tons.

Drainage : The drainage in the ayacut area in general is only moderate. The valleys in between the spurs are not efficiently drained. Most of the wells in this area have the water table at present risen up to the ground level. Before the introduction of irrigation the water table was several feet below.

Methods of soil survey: A base map of the Amaravathy ayacut area prepared to scale 1″=1 mile, showing the important roads, villages, streams, canals etc. was used for the field work. The proformas prescribed by the I. A. R. I. in the standard methods of soil survey was used for the collection of agro-economic data for the villages in the ayacut area. The entire ayacut area consists essentially of a series of sub-water sheds; each sub-water shed was taken as a unit for soil examination. The areas were traversed on foot and soil profiles up to parent rock were examined according to topography, drainage conditions etc. for each unit or a series of two or more units if they are too small. The soil horizons were examined for texture, structure, consistence, reaction etc. following the methods described in the standard methods of soil survey. Soil samples from each horizon were also collected for detailed analysis in the laboratory.

Morphological examination of soil profiles: Forty seven soil profiles were examined representing the high and low level areas. Some of the typical high and low level soil profiles in the two taluks are described in tables appended.

Conclusions from the field studies: From the description of the profiles and the hydrological and topographical features the following important points emerge.

(a) The soils have developed on material derived from the underlying gneissic rock. While in the upper aspects of the slope the soils have been formed on the residium, in the lower aspects the soils formed on the residium are underlain by deposits of alluvium either originated in the upper slopes and brought down by eroding water or formed elsewhere and deposited during floods in the rivulets that occupy the valleys.

(b) The red earths (latosol) occupying the top and slopes of the undulations are formed under conditions where there is a net downward movement of water. These red earths may be divided into two soil classes (1) the Udumalpet class and (2) the Dharapuram class. In the former, granitic or feldspatic or feldspatic gneiss and in the latter hornblendic gneiss are the parent rocks.

(c) The amount and depth of occurrence of kankar (Calcium carbonate) differentiates the two classes. In the Udumalpet class (Profiles 1, 45, 5, 16 and 19) nodular calcium carbonate is not generally met with in the surface and subsoils. However due to limited rainfall (20″) causing concentration and deposition from the

percolating waters, the deep layers containing mostly the fragments of disintegrating rock at the bottom have nodular Calcium carbonate also. In the Dharapuram class kankar is met with even in the surface and subsoils indicating the calcareous nature of the residium from which they are formed (Profiles 25, 28, 32).

(d) The calcium taken up in solution and carried in subsoil flow from the higher regions is precipitated as Calcium carbonate in the profiles of the valleys. This precipitation is brought about by the elevated soil pH caused by the impeded drainage conditions obtainable in the valleys. The saline, alkaline and other hydromorphic soils that occupy the valleys are only variants or phases of the red earth above formed under the influence of drainage.

(e) Thus, climate and parent material remaining unchanged in any given sub-water shed in the ayacut area, soil formation is influenced mainly by topography. Under the influence of the undulating landscape, a catenary sequence of soils ranging from typical red earths (latosol) to their halomorphic and hydromorphic varients are recognisable in a traverse from the top of the spur to to the bottom of the adjacent valley.

Laboratory examination of the soil samples: All the samples were analysed for soil texture by international pipette mothod and textural class was determined by the triangular method developed by Prescott, Taylor and Marshall (1934). The results indicate that the entire ayacut area soils at all the depths are generally of a light texture (sandy to sandy loam) thus confirming the field observations.

The composition and concentration of total soluble salts were determined for all the soil samples using a soil water ratio of 1 : 5. The average values obtained for the typical profiles in the elevated and low level areas in the two taluks are presented in table I.

It may be seen that (Vide table I.) the higher level areas particularly in Udumalpet taluk are only moderately drained as is indicated by the figures for total soluble salts (0·27% and 0·13%). This concentration is not excessive considering the salts resistence crops like cholam, cotton, ragi, tobacco etc. that are to be raised in such areas. The quality of irrigation water both from wells and canals in the area have also been found to be of good to moderate quality and may be used to irrigate plants with good salt tolerance (Govinda Iyer and Subramaniam 1960). The data for the low lying areas reflect a different picture altogether. Although the total

concentration of soluble salts is not so excessive there are toxic amounts of carbonate ions indicating that the base exchange complex is abnormally saturated with sodium and the soil has all the associated physical and chemical abnormalities. However a good proportion of the total cations consists of bivalent Ca plus Mg. This is a very valuable asset from the point of view of reclamation of such areas. On mere dilution of the soil solution such as may occur during irrigation and on improvement of external and internal drainage, most of the absorbed sodium will be replaced by Ca and Mg. The soil will then be converted into a normal one. This is because dilution increases the replacing power of bivalent cations much more rapidly than that of sodium (Kelly 1951 & 1948).

Irrigation Suitability of the Soil: An irrigation soil survey has the object of arriving at an estimate of the suitability of the soils for irrigation. Since irrigation efficiency is dependent upon the soil characters such as depth, drainage, tilth, salinity etc. this type of survey has to pay special attention to these soil factors in addition to usual purpose for which soil surveys are undertaken such as genetic, fertility, land use etc. Considerable changes in these soil characters may take place as soon as the soil is subjected to irrigation for agriculture and a proper appraisal of such changes should be made before determining the probable response to irrigation on these soils. It is therefore apparent that the "compilation" of the soil called "irrigable value soil map" is the main object of irrigation soil survey.

To arrive at this, soil profile studies in the field are classified into four grades as follows (Dewam 1953) :

1. An 8' depth of soil free from undesirable layers such as hard pan, dense clay or coarse sand etc.

2. At least 4' of soil of grade (1) resting on solid containing interfering layers or semi-permeable hard pan or clay, very open sand etc.

3. At least 4' of soil of grade (1) resting on solid rock or other impermeable formation, or 30" of soil of grade (1) resting on semi-permeable or gravelly layers.

4. Shallow soils which do not conform to the above grading such as less than 4' of soil on impermeable rock or less than 30" of soil on semi impenetrable or markedly interfering layers. This may be called the permeability profile. Similarly, the soil is classified according to the average salt content of the profile.

Grade I: Includes profile showing an average salt content of less than 0·15%.

Grade II: Average salt content of 0·15 — 0·35%.

Grade III: Average salt content from 0·35 to 0·55%.

Grade IV: Average salt content of over 0·55%.

These two factors are combined to deduce the final irrigable values thus:—

Profile	*Salt*	*Irrigability*
I	I	I
II	I	II
I	II	
II	II	III
III	I	
I	III	
Others.....		IV

Based on the above criteria tentative average irrigable values for the soil classes and their variants in the Amaravathy ayacut area, may be assigned as shown in Table I.

Conclusions: It will be observed from the above that in general the soils of the Amaravathi ayacut area are only III rate in point of its suitability for irrigation. This is based of course on the information gathered so far. Such a low rathing has been caused chiefly bythe improper soil depth and or drainage of the soils of the area.

According to the cropping programme for the ayacut area, most of the higher level areas lying adjacent to the canal are to be grown to dry crops requiring only light irrigation. But in actual practice paddy is being cultivated in many such areas. There is also extensive seepage from the cannal and laterals because of the general light textured nature of the soils in the area. This has further aggravated the drainage problem in the valleys. It was noticed that in some valleys tobacco was growing well before, but does not come up so well now and has given place to paddy which crop also has only stunted growth due to the high water table. In order to avoid this difficulty the canal should be lined at least in portions where there is too much seepage, and a strict adherance to

the cropping programme should be insisted upon. A general improvement in the existing drainage system and its maintenance in good repair are also of paramount importance for the permanence of irrigated agriculture in the tract.

Summary: Results of prelimanary soil studies in the irrigation soil survey of the Amaravathi ayacut area are reported and discussed. The soils have been divided into two soil classes Udumalpet and Dharapuram. Tentative irrigability values have been assigned to the soil classes and their halomorphic phases. A general improvement in the drainge system is recommended for maximum response to irrigation in the tract.

Acknowledgment: The authors are greatly indebted to Sri John Durairaj, Reader in Soil Science and to Sri T. A. Ananthanarayanan, Assoc. Prof. of Soil Science for their guidance and suggestions in the conduct of the work and preparation of this paper.

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TABLE I.

Tentative average irrigable values for the soils of Amaravathy ayacut.

Taluk	Location	pH	M. E./100 grams of soil							Total and grade	Soil profile & grade	Average irrigable value
			Co_3	HCo_3	Cl	So_4	Ca	Mg	Na			
UDUMALPET TALUK	High Level	8·0	...	0·34	0·31	1·77	0·66	0·54	1·28	0·27 II	Generally 30" of soil free from undesirable layers such as hard pan etc., resting on gravelly layers. Permeable. Grade III	III
	Low Level	8·7	0·45	0·57	0·35	1·82	0·87	0·47	1·30	0·20 II	Generally less than 30" of soil resting on unpermeable layer or temporary high water table. Grade III	III
DHARAPURAM TALUK	High Level	8·6	0·28	0·58	0·62	0·95	0·64	0·62	1·10	0·13 I	Generally 30" or less of soil mixed with kankar nodules and rock fragments but free from undesirable layers such as hard pan etc., resting on gravelly layers permeable. Grade IV	III
	Low Level	8·6	0·40	0·56	0·33	0·87	0·52	0·25	1·39	0·18 II	Generally less than 30" of soil resting on impermeable layers or temporary high water table. Reclaimable. Grade III	III

UDUMALPET — MODERATELY DRAINED.

VEDAPATTI – PIT. No. 16

0″ — Brown sandy, slightly aggregated, friable—

DIFFUSE CHANGE TO

8″ — Dark brown sandy loose and with small pieces of ferruginous gravel

IRREGULAR CHANGE TO

20″ — Dark brown gravelly sandy clay loam, structureless with fragments of decomposing feldspar and quartz in dark brown clay matrix overlying saft decomposing parent rock.

28″

MADATHUKULAM 0 PIT. No. 5

0″ — Light brown sand slightly aggregated, friable consistence, few roots and neutral in reaction.

FAIRLY WELL DEFINED CHANGE TO

6″ — Brown sandy hortizon with yellowish brown streaks and rounded ferruginous gravel.

GRADUAL CHANGE TO

20″ — A brown sandy layer with more ferruginous gravel, fragments of quartz and feldspar than above overlying partly weathered parent rock.

30″

ELAYAMUTHUR – PIT. No. 19

0″ — Red with tinge of grey at the surface due to organic matter, sandy with few ferruginous gravel and few roots and loose consistence.

ABRUPT CHANGE TO

18″ — Reddish yellow to reddish-white sand, structureless with quartz, feldspar and few banker nodules overlying slightly slightly weathered soft rock.

37″

THUNGAVI – PIT. No. 19

0″ — Brown sand, single grained, loose consistence, neutral in reaction and with few roots –

ABRUPT CHANGE TO

4″ — Reddish brown clay-loam, structureless moerately firm, with whitish streaks of Calcium carbonate.

ABRUPT CHANGE TO

18″ — Light red sand with small pieces of gravel, streaks of Calcium carbonate and dark iron staiming.

ABRUPT CHANGE TO

22″ — Dark brown gravelly sand with streaks of Carbonate and pieces of quartz etc., overlying soft decomposing rocks.

65″

AMARAVATHI NAGAR – PIT. No. 1

0″ — Brownish blacksand slightly aggregated, loose consistence and with few roots.

ABRUPT CHANGE TO

4″ — Brownish white sandy-loam aggregated loose consistence, neutral in reaction and with few roots.

ABRUPT CHANGE TO

18″ — Brown sand structureless and mixed with fragments of quartz feldspar and ferrugenous gravel

DIFFUSE CHANGE TO

30″ — Whitish brown gravelly sand, structureless with kanker nodules and with more fragments of quartz and feldspar than above overlying less decomposed material and slightly fragmented solid rock

72″

UDUMALPET — IMPERFECTLY DRAINED.

NILAMBUR — PIT. No. 10

0″ — Greysand, loose, slightly moist, alkaline in reaction

GRADUAL CHANGE TO

6″ — Brown sandy, wet with highly dispersed clay, kankar nodules and ferrugenous gravel lying over an alkaline sub water table at 24″

24″

KUMARALINGAM WEST - PIT. No. 7

0″ — Grey sandy loam, moderately aggregated, friable, neutral in reaction with greyish white patches due to salt on surface

ABRUPT CHANGE TO

6″ — Yellowish grey sandy loam, blocky slightly firm, alkaline in reaction, slowly permeable and with mottlings in the form of rusty streaks on a grey background.

CLEAR CHANGE TO

12″ — Grey sandy loam, blocky, highly dispersed clay, alkaline reaction with more rusty streaks, fragments of quartz and kankar nodules overlying on alkaline subwater table

24″

ELAYAMUTHUR – PIT. No. 43

0″ — Light grey sandy loam slightly aggregated friable with line concretions.

IRREGULARLY CHANGE TO

3″ — Gray brown sandy, moist with dark brown strains of iron and kanker nodules, alkaline in reaction.

IRREGULARLY CHANGED TO

9″ — Grey brown sandy loam, wet, sticky consistency, firm on drying, blocky structure, with lime concretions and lying above the water table. Wateralkaline to phenalphthalein.

32″

THUNGAVI — PIT. No. 20

0″ — Light red sandy, clay highly dispersed, alkaline, small pieces of nodular calcium carbonate, slow infillration rate.

IRREGULARLY CHANGE TO

12″ — Red to brown heavier soils, blocky, highly dispersed clay, hard on drying with more kankar. nodules than above and also with dark brown rusty streaks overlying the water table at 36″, the subsoil water alkaline, water permeability slove.

36″

JOTHAMPATTY — PIT. No. 17

0″ — Brown sand, highly dispersed, clay, low infiltation rates.

GRADUAL CHANGE TO

6″ — Brown sandy, loam blocky, firm with alkaline white streaks of kankar.

GRADUAL CHANGE TO

24″ — Dark brown sandy zone, sticky, firm on drying with dark brown nothings in the form of rusty streaks on a grey background dark brown iron gravel and grey to white kankar nodules.

GRADUAL CHANGE TO

32″ — Dark brown sandy loam sticky and hard on drying with mottling, concretions and nodules more than above on an alkaline water table at 37″

37″

DHARAPURAM — MODERATELY DRAINED AREAS

CHINNAKKAMPALAYAM — PIT. No. 30

0″ — Red brown sandy loam, slightly aggregated, loose and with few streaks of lime.

ABRUPT CHANGE TO

4″ — Red brown loam with kankar nodulep and few pieces of disintegrated rock fragments.

IRREGULARLY CHANGE TO

8″ — Red clay, blocky, firm with broken pieces of quarts pebbles, feldspar and kankar nodules cemented in a clay matrix and overlying the less weathered parent rock.

14″

CHETTIPALAYAM — PIT. No. 32

0″ — Graybrown sandy loam, aggregated, friable, with streaks of Calcium carbonate and moderately permeable,

ABRUPT CHANGE TO

6″ — Brownish black loam with kankar nodules.

IRREGULARLY CHANGE TO

12″ — Brownish black-clay to clay loam with plarty of kankar nodules and fragments of disintegrating rock overlying soft less weathered greissie rock.

26″

DHARAPURAM — IMPERFECTLY DRAINED AREAS ON THE FLOOR OF THE VALLEYS.

KUMARAPALAYAM – PIT. No. 26

0″ — Red, sandy, single grain loose and alkaline in reaction and with kankar.

ABRUPT CHANGE TO

6″ — Reddish brown, sandy blocky, firm and abundant kankar.

13″

KARATOLU — PIT. No. 22

0″ — Red brown, moderately moist, sandy, loose, slightly alkaline, low infiltration rate due to highly dispersed clay and with kankar nodules

ABRUPT CHANGE TO

4″ — Red brown sandy, moist, sticky, hard on drying, highty disbersed clay, alkaline in reaction, slow permeability and with kankar nodules overlying the water table at 14″

14″

CHINNAKKAMPAYAM – PIT. No. 28

0″ — Reddish brown, sandy single grain, loose, alkaline with streaks of calcium carbonate and few roots

ABRUPT CHANGE TO

5″ — Reddish brown loam to to clay loam, blocky, sticky and hard on drying with abundant calcium carborate nodules overlying the water table at 17″. Water alkaline to phenalphthalien

17″

CHETTIPALAYAM PIT. No. 31

0″ — Brownish black loam, aggregate, friable with streaks of calcium carbonate and plenty of roots alkaline in reaction

6″ — Black, loam to clay loam, hard, blocky with plenty of calcium carbonate nodules, alkaline in reaction and low permeability.

18″

NATTUKAPALAYAM – PIT. No. 34

0″ — Grey brown sand, structureloss loose with streaks of calcium corbonate.

ABRUPT CHANGE TO

4″ — Brown gravelly and dispersed clay with few nodules of kankar and low permeability.

GRADUAL CHANGE TO

11″ — Red to red brown gravelly sand with plenty of fragments of parent rock and kankar nodules overlying less weathered and soft parent gneissic rock.

42″

A New Bacterial Leafspot Disease of Maize

Maize or corn *(Zea mays* L.) was found affected during 1959–'60 by a severe leafspot disease in some parts of South Arcot, Madras State. The disease was found more commonly in the colder months than in the summer season. First water-soaked lesions appear on the leaf blade and leaf sheath. They are at first green, but later become yellowish brown and translucent (Fig. 1.). The spots, when mature, are round, elliptical or irregular with yellowish haloes and they occur throughout the leaf blade. They may vary in size from 2 to 10 mm. in diameter. Severely affected plants are stunted and the newly emerging leaves are smaller and chlorotic. With age, the spots turn brown in the centre with reddish brown margin and the whole blade may present a scorched and withered appearance.

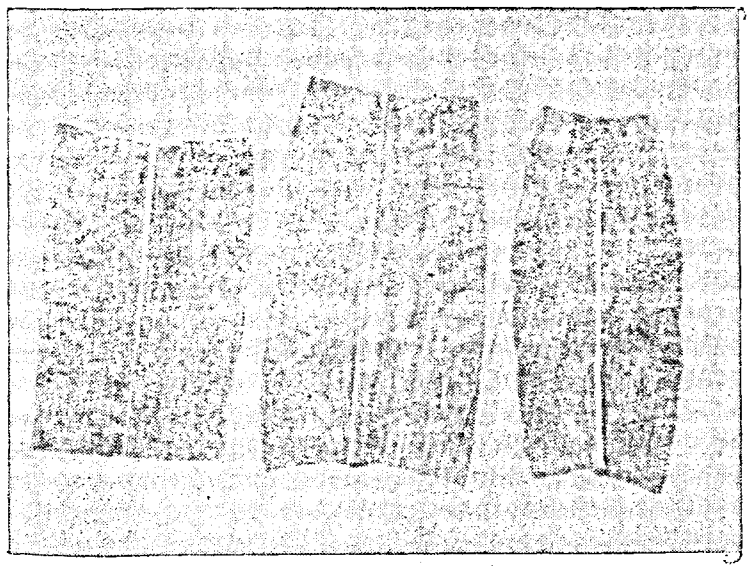

FIG. 1.

Leafspots of maize caused by *Xanthomonas maydis* Rang. *et. al.*

The bacterium was brought into pure culture and its pathogenicity established by the usual methods of inoculation. When the bacteria suspension was sprayed on the healthy leaves of a month old maize plants disease symptoms appeared within 6 days. The pathogen was reisolated from the infected tissues and on comparison was found identical with the original inoculum.

Several bacterial diseases have been reported on this host in other countries: *Pseudomonas syringae* v. Hall, *Ps. lapsa* (Ark) Starr. and Burk., *Ps. andropogonis* (E. F. Sm.) Stapp., *Ps. alboprecipitans* Rosen, *Xanthomonas stewartii* (E. F. Sm.) Dowson and *X. albilineans* (Ashby) Dowson (Elliott 1951). Besides, *Erwinia dissolvens* (Rosen) Burk. has been reported to cause stalk rot of maize in Bihar, India (Prasad 1930) and a similar stalk rot disease of the crop in Andhra State, caused by *E. carotovora* f. sp. *zeae* Sabet by Hingorani *et al* (1959). The organism under study is much different in its morphological, cultural and physiological properties and also in the symptoms produced on the host and so is named as a new species. *Xanthomonas maydis* Rangaswamy, Prasad and Easwaran, sp. nov.

The bacterium is a short rod, $1.8-2.7 \times 0.8-1.0\ \mu$, mostly found single, monotrichous with single polar flagellum, aerobic, gram-negative, non-capsulated, non-spore forming and non-acid fast. It forms deep yellow spreading colonies on nutrient agar and in nutrient broth the growth is turbid with yellow sedimentation. Gelatin is liquified moderately and strach hydrolysis is slow. Litmus milk turns neutral and the milk is thickly curdled. H_2S is produced but nitrate is not reduced and indole not produced. It gives negative lipolytic activity and M. R. tests and positive V. P. test. Lactose is utilized as a carbon source, with slight acid production but no gas formation.

The bacterium is pathogenic on *Zea mays* L., causing the characteristic leafspots. On artificial inoculation it was found to infect *Brachiaria mutica* Stapf., *Cenchrus ciliaris* L., *C. glaucus* and *Sorghum vulgare* Pers. and not *Oryza sativa* L., *Pennisetum typoides* Rich., *Panicum maximum* Jacq., *Paspalum scrobiculatum* L., *Eleusine coracana* Gaertn., *Setaria italica* Beauv. and *Echinochloa frumentacea* L.

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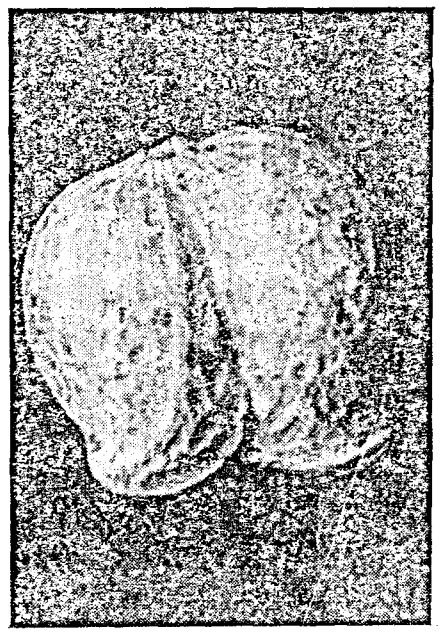
Double fruit in *Arachis hypogaea* Linn.

The occurrence of a double fruit in *Arachis hypogaea* L. is reported here. This abnormal pod was spotted in the bulk produce obtained from T. M. V. 2, a high yielding bunch type of groundnut raised for seed multiplication during 1961 at the State Seed Farm, Bhavanisagar. It was composed of two single seeded pods of 1·3 x 0·5 Cms. each, fused longitudinally to the entire length on their ventral side with beaks facing opposite (Fig. 1) and was structurally indehiscent since the fusion was along the ventral suture which is the line of normal dehiscence in a groundnut pod. The fused fruits were separated carefully by cutting through the line of fusion with a sharp blade. On examination it was found that except for the scar formed on the ventral side due to fusion, each pod had a pericarp or shell of their own and a seed inside as in normal single seeded pods.



Double fruit in *Arachis hypogaea* Linn.

The family *Leguminosae* is typically monocarpellary but exceptions to this character have been reported in various genera by different authors. Under *Papilionoideae*, bicarpellary condition has been recorded by Worsdell (1916) in *Phaseolus multiflorus* Willd.; by Krishnamoorthy (1934) in *Sesbania grandiflora* Pers.; by Rao (1954) in *Crotalaria laburnifolia* Linn.; by Dutta (1956) in *Vigna sinensis* Savi. and by Veeraswamy (1958) in *Dolichos lab-lab* Linn. Veeraswamy (1960) has also recorded a case of abnormal fruit in *Dolichos lab-lab*. In the same family Worsdell (1916) has observed the occurrence of two to three carpels in *Trifolium repens* Linn.

The abnormal groundnut pod reported herein might have developed from a bicarpellary syncarpous pistil or from a double ovary.

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Appropriate time for taking up Control Measures against Fruit Flies on Ash Gourd *(Benincasa cerifera)* and Pumpkin *(Cucurbita moschata)*.

The fruit fly, *Dacus cucurbitae* Coq. causes considerable damage to the ash gourd and the pumpkin. Under the auspices of the Vegetable Scheme, financed by the Indian Council of Agricultural Research, investigations were under progress on the seasonal incidence and control of this pest on both these crops. In order to fix the best time for taking up control measures, observations were made to find out at what stage of the fruit development the incidence of the pest is most evident and a brief account of the same is given below:—

It was found that in both the crops, the fruit fly attacks mostly the very small tender fruits just after fruit set. The fly lays cigar shaped eggs into the fleshy portion of the tender fruits thrusting them with its ovipositor and covering the puncture with a sticky secretion. It is only at this stage of fruit development when the outer skin will be soft that the fruit fly is able to puncture the fruits easily with its ovipositor. After this stage, the outer skin becomes hardened when the fruits can escape the attack. The maggots that hatch out from the eggs in about three days feed on the pulp, gradually working themselves into the inner core as they develop. The damage to the tender fruits can be made out by the puncture holes, the exudation of a smelly fluid from the puncture holes and premature yellowing of the fruits rendering them useless. As a consequence, most often, the tender fruits rot and drop down, but occasionally, the fruits in spite of the

attack, grow to some size and rot at a later stage making them unfit for consumption. The numerous maggots from the rotting fruits drop down into the soil, pupate and later emerge as fruit flies and continue their activity. So, it is at the time of initial fruit set that control measures should be resorted to. The infested fruits, if any should be regularly removed and destroyed by burning them. The loss on account of the depredations of fruit fly has been estimated to be approximately 50% as shown below. By taking prompt control measures, the loss in yield could be prevented. This could be achieved by treating the crops with parathion (Folidol) 0.05% or Malathion 0.1% four times at intervals of 10 days commencing from the time of initial fruit set.

S. No.	Varieties	Percentage of fruit fly incidence on the tender fruits	Percentage of fruit fly incidence on the older fruits (which have passed the stage of tenderness)
		ASH GOURD	
1.	H. 57	65	Nil
2.	H. 105	53.3	Nil
3.	H. 168	37.5	Nil
		ASH GOURD	
1.	H. 57	43.0	9
2.	H. 162	50.0	5.3
3.	H. 168	50.0	6.3
		PUMPKIN	
1.	H. 58	66.7	Nil
2.	H. 59	100	Nil
3.	H. 104	93.8	Nil
4.	H. 161	84.6	Nil
5.	H. 167	100	Nil
6.	H. 185	80	37.5
7.	H. 186	93	43
8.	H. 198	100	Nil
9.	H. 304	100	Nil
10.	H. 303	50	50
11.	H. 302	100	12.5
12.	H. 301	83.3	Nil
13.	H. 342	40.0	Nil
14.	H. 343	25.0	Nil

There is no poisonous hazard involved in treating these crops with parathion (Folidol) in as much as it takes two months for the fruits to become fully mature when only they are harvested. Malathion however is a safer insecticide but it stands only next to parathion in its efficacy against the fruit fly as well as the other pests.

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Proliferation of Spikelets in the Italian Millet (*Setaria italica* Beauv.)

At the time of evaluation of single plants in the new selections for economical characters, a plant in the short duration culture M. S. 6498/2-7 isolated from a Siberian variety was observed to possess an abnormal panicle bigger in size than the rest. The plant was normal in respect of other characters. It had five tillers of which one had produced the abnormal panicle. A closer examination of the panicle revealed that five spikelets by about the middle region were modified to green leafy structures which were protruding out prominently. No roots or root-like structures were produced in the proliferated spikelets. The rest of the spikelets in the panicle had set seeds. These green leafy structures, when removed and planted in the soil, did not root. The progeny raised from the seeds of the proliferated panicle did not repeat this phenomenon in the following summer season. The present case is not due to any fungal infection.

Proliferation of spikelets in other cereals like maize (Reaves *et al* 1940) and sorghum (Karper 1936) have been shown to be controlled either by gene or environment or by both. Karper *(loc. cit.)* who has recorded a similar case in sorghum expressed that "the most likely cause of the phenomenon appears to be an unusual combination of environmental factors encountered by those particular plants at a critical stage in the early development of the reproductive organs".

A germplasm bank housing about 160 types representing the cultivated varieties of the world are being maintained at the Millets Breeding Station, Coimbatore and they are grown both in monsoon and summer seasons. In the Siberian selection the spikelets had proliferated during the monsoon season when the condition of the environmental influence as determined by the seasonal rainfall and humidity of weather, had been quite different from that of the summer season. Besides, in the case of the wild species of *Setaria*, *Setaria pallidifusca*, a similar proliferation has been noted to occur repeatedly in the monsoon season only. Such a seasonal influence in the expression of proliferation is perhaps one the few other characters which are peculiar to some varieties. For example, certain varieties have been noted to express their yield potential better in a particular season. Studies along this line may give indications of the contributive factors which are responsible for the full expression of the character.

The author is thankful to Shri S. G. Aiyadurai, Millets and Pulses Specialist, for his guidance in the preparation of this note.

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AGRICULTURAL JOTTINGS.

We enter the cool winter months in November. The days are becoming shorter, the sun's heat has abated and temperature is gradually coming down. The showers of the north-east monsoon continue on.

The Paddy Stem Borer Menace: This pest also affects the paddy crop in almost every district where paddy is cultivated. It has been found that this is a very difficult pest to control but even so, modern insecticides are able to keep this pest under check to a great extent.

The paddy stem borer is a caterpillar which bores into the stem of the rice plant and kills the shoot. This can be noticed by the characteristic white ear head. Trials conducted in many places have indicated that the best method of controlling this pest is to spray with parathion compound. The insecticides in the market that contain parathion are folidol and paramar and others in a strength of parathion 50%. This is sold as a liquid and on oz. of the liquid is mixed with 12½ gallons of water for spraying purposes. As a complete preventive measure it is necessary to spray three times, first in the nursery, second within the fortnight after transplanting and the third while the crop is nearing flowering stage. These are preventive measures which would prevent the occurrence of this pest and control it also if and when present. If places where the pest has already come, spraying once or twice will be helpful to check the pest at that time. The cost of spraying is not very high and therefore it is good that preventive sprays are adopted wherever possible. The Plant Protection Officer may be contacted if more information is required.

Control the Mango hopper: There are many pests affecting the Mango, but the most important one is the mango hopper. It is a very small insect green in colour and about 1/6th of an inch in size. This hopper is able to suck the juice and puncture the tissues and thus deprive the flowers, the small fruits and the tender shoots of their sap. As a result of this the inflorscene wilts and dries up. This pest is found all over the State abundantly during the months of November to January which is the flowering season for mango. The insect develops by depositing the eggs in the tissue of the flower shoots in the unopened flowers and start their activities as soon as they hatch out when the flowers open. The presence of the hopper can be found by the clicking sound produced when they strike against the leaves when the branches are disturbed. Honey can be noticed on the leaves below the flowers giving a shining appearance to the leaves in the mornings and bees and flies are attracted by it. In extreme cases, it may be noticed that leaves are turning black due to sooty mould which develops on the leaves.

The hopper can be controlled by spraying D. D. T. O. 1% strength which is made by mixing 1 lb. of DDT 50% wettable powder in 50 gallons of water. This spraying should be done at the time when the flowers are put forth. Another spraying may be given one or two months later to control the pest found on the flowers that may be produced later and also to protect the newly forming fruits. In some place, parathion 0·05% is also applied. As this is a dangerous poison, it is better that DDT only is used. Some people believe that spraying will lead to shedding of the flowers but this is not correct. Actually spraying will increase the number of fruits that will set from the flowers and increase yields. To prove this a demonstration by power spraying against the hopper was conducted at Dharmapuri with very good results.

Look for the Tikka Leaf spot in Groundnut: Tikka leaf spot is an important disease found in the groundnut crop in our State. The disease appears generally in the later stages of the field. The disease is easily identified by the affected leaves on which will be found dark brown spots. Leaf stalk and the young stems are also sometimes affected with these spots. The disease can be easily controlled by spraying Bordeaux mixture 3/4th percent strength, which is prepared by mixing 3/4 lb. copper sulphate in 5 gallons of water and 3/4 lb. of lime also in gallons of water and mixing together to make up 10 gallons of the mixture. Alternatively, powdered sulphur can also be dusted to control this disease. It has been found that about 15 pounds of sulphur would be required per acre. When heavily infected it may be necessary to dust two or three times. As it is very economical to dust, the small cost of dusting should not be minded by farmers, because when the crop is very badly affected the yield goes down very much.

Top dressing for Cambodia Cotton: The Cambodia cotton crop responds very well to top dressing with ammonium sulphate. For the crop planted in September, top dressing could be done now. Research on manuring the cotton crop has indicated that basal application of 100 lb. of amonium sulphate per acre prior to dibbling the seed followed by top dressing at the same rate at the time of commencement of flowering benefits the crop resulting in extra yield. The plants in their vigorous growth phase utilise the nitrogen supplied through the ammonium sulphate with advantage. They are induced to form more bolls and yield more kapas. Top dressing is the process of applying fertilisers to standing crops. The ammonium sulphate is applied in two bands at the base by hand about six inches from the row of the cotton plants taking measured quantities. This is followed by working a ridge plough in the furrow to earth up, which buries the ammonium sulphate in the soil root zone of the cotton plant. Immediately after this operation liberal irrigation is given to the field.

Cotton Certification Scheme : Superior strains of cotton are evolved by the Cotton Specialist with a view to produce higher yields and better quality of cotton. When our farmers take up to cultivation of these superior varieties, it is appropriate that they should be helped to get a better price for the good quality cotton they produce. It is therefore necessary to certify that the cotton that is grown by the farmer is of the improved strain, so that with this certificate he can claim a better price for his produce when he sells it in the market. The Cotton Certification Scheme initiated by the Government is intended for this specific purpose, namely, to help the farmer to get a better price for the superior varieties which he grows in his farm.

This certification scheme applies to three important strains of cotton namely MCU 1, MCU 2 and MCU 3 grown by the cultivator in the pure state. By this certification scheme, the merchants are also benefited because they are assured that the produce that is produced by the farmer is of very high quality. This certification scheme was started about a decade ago and many farmers have benefitted by the certification scheme. Both MCU 1 and MCU 3 grown as winter crops and MCU 2 raised as a summer crop are eligible for certification. It is necessary that the seeds for growing these crops should have been purchased from the depot of the Agricultural Department or through the approved agents like the Co-operative Societies in the area. As a token of this purchase, the cash receipt should be properly preserved and can be produced while applying for the certificate. For obtaining a certificate, a fee of Rs. 1.50 is charged for every acre and what the farmer has to do is to apply to the Extension Officer from whom the prescribed form for application is obtained free. After filling up the form it can be handed over to the Extension Officer with the receipt obtained for the seed. After application, the crop will be inspected by the Certification staff and if it has been satisfactorily grown and the purity is not less than 95%, the certificate will be issued. The certificate can be produced by the farmer to the dealer who is interested in buying the produce.

The last date for application for obtaining this certificate is 31—12—1961. But it is better that farmers approach the Extension Officer and make applications as early as possible.

From past experience, it is seen that a pothi of certified kapas fetches about Rs. 10 to 15 extra and therefore farmers can get upto Rs. 50 to Rs. 60/- per acre by this certification scheme, and therefore if you are growing improved seeds, it is better that you get the benefit of the higher price by obtaining the certificate from the Agricultural Department. The nearest Extension Officer will help you with further particulars.

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Maintain Your Seeds Pure : Maintenance of purity and quality involve care during various stages of cultivation, harvesting, threshing, winnowing, bagging etc., In the field, care should be taken to see that the same improved strain is grown year after year. This will take care about mixtures occurring from stray escaped plants of other varieties cultivated in previous years. An important work connected with maintaining purity is roguing. A 'rogue' is a common name given to a type different from that is grown in the field. During maturing stage, these off types could be easily located and they are carefully looked for in the field and removed. This roguing is carefully done by thoroughly going through the field two or three times if necessary. Harvested lots of different strains should be kept separately if a farmer is accustomed to grow more than one improved strain in his farm. The threshing floor must be well swept and washed with cowdung and scrupulously cleaned. While storing, old gunnies should be turned inside out, thoroughly cleaned, and dried before the bags are filled. Each bag should be labelled with the name of the strain both inside and outside, so that the one inside will be safe, even if the one outside gets lost. When heaps are made, they should be separate and far away from each other. Storing should be in separate places. All these would help to maintain purity. Generally when high class seed are sown there will be only one or two rogue plants for about every 250 square meters of the field or about 20 to 30 to an acre.

Cowdung Gas Plant : When cowdung ferments in the absence of air, a combustible gas called 'methane' is produced, which can be stored in a tank and led through pipes to be burnt as fuel. The cowdung gas plant is a device for making the fuel gas from dung. In the dung there is no reduction in its manurial value. Indeed, the manurial value is said to be improved by such fermentation. One special advantage is that there is no fly breeding either in the fresh slurry or in the digested slurry in the drying bed.

The cost of a cow dung gas plant designed to utilise the dung from about four animals on a farm is Rs. 350/-. It consists of a fermentation tank, square or cylindrical with brick walls about six feet in diameter and 12 feet depth. This is filled with cowdung made into a liquid slurry with water. It is covered with an iron drum which cuts off air and provides conditions for fermentation. The spent slurry overflows from the wall and is collected for use as manure.

The gas can be used for cooking as well as for lighting purposes and even for running a 3 HP engine. When led into proper burners of the bunsen or other type as found in chemical laboratories, the gas burns with a blue flame and is hot and smokeless reaching 500° C. It makes cooking much more quick and neat.

Maintain Farm Accounts: Farming is a business proposition and therefore accounts are necessary for farming as much as for a business or trade. No farmer can expect to run a farm efficiently without adequate records and accounts. There are several advantages to be derived from maintaining accounts. Firstly the accounts facilitate a farmer to know his correct financial position and relate his profits to the capital invested. Secondly, accounts facilitate in many business dealings, to open loans with co-operatives etc. For farm business or for other purposes, he may obtain a more sympathetic treatment from his creditor when accounts are presented. Accounts also help in many legal entanglements of the farmer. The value of farm accounts from the point of view of efficient management of the farm is the most important. A detailed analysis of the accounts will indicate the weak points in his management. Efficiency can be increased by effecting economics by locating wastes and by a proper planning for the future.

Accounts also help the farmer to effect comparisons of the performances of one year with the results of previous years and also to effect comparisons with his neighbours and to learn from their experiences. The farmer who keeps accounts is more inclined to give better attention to his farm as the records will show him the result of the year's work. He would understand the advantages of improved farming methods better than one who has no accounts. Indeed farm accounts are a basis for improved Agriculture which will lead to increased profit and a better way of life from the farm. The accounts for this purpose need not be very elaborate. The simpler the sytem of account the greater will be its use. Complicated systems are tiresome and discouraging.

(From the Extension Specialist, Agricultural College and Research Institute, Coimbatore-3.)

THE MADRAS AGRICULTURAL STUDENTS' UNION - ELECTIONS

1961—'62

List of Valid Nominations

Vice-President	:	1. Sri S. Rajarathnam 2. Dr. D. Daniel Sunderaraj
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Secretary	:	1. Sri M. Stephen Durairaj 2. ,, K. Khaleel Ahamed 3. ,, M. Balasubramaniam

The last date for receipt of Postal-Votes is 20—11—1961.

Weather Review — for September, 1961.

RAINFALL DATA (IN INCHES)

Region	Station	Total rainfall for the month	Departure from normal	Total since 1st January
North	Madras (Meenambakkam) ...	8·6	+ 3·9	20·7
	Tirurkuppam*	6·0	+ 1·7	31·4
	Vellore	10·0	+ 3·2	29·0
	Gudiyatham*	5·5	+ 0·7	24·8
East Coast	Palur*	6·2	+ 1·8	34·1
	Tindivanam*	3·6	— 0·1	26·0
	Cuddalore	5·1	— 0·1	37·2
	Nagapattinam	2·5	— 0·8	16·5
	Aduthurai*	9·9	+ 5·3	27·8
	Pattukkottai*	2·4	— 1·1	19·6
Central	Salem	9·6	+ 3·5	29·3
	Coimbatore (A. M. O.)* ...	0·3	— 0·7	19·5
	Coimbatore	0·4	— 1·2	20·0
	Tiruchirapalli	8·1	+ 4·1	23·4
South	Madurai	2·2	— 2·5	15·3
	Pamban	—	— 1·1	9·4
	Koilpatti*	1·2	+ 0·2	15·9
	Palayamcottai	0·2	— 1·0	12·1
	Ambasamudram*	0·9	— 0·4	26·4
	Nagercoil*	1·9	— 0·5	45·6
	Capecomorin*	1·0	— 0·2	35·6
Hills	Kodaikanal	3·9	— 3·3	32·8
	Coonoor*	8·4	+ 4·5	48·1
	Ootacamund* ...	2·8	— 1·6	43·1
	Nanjanad*	4·4	— 0·6	67·8

* Meteorological Stations of the Madras Agricultural Department.

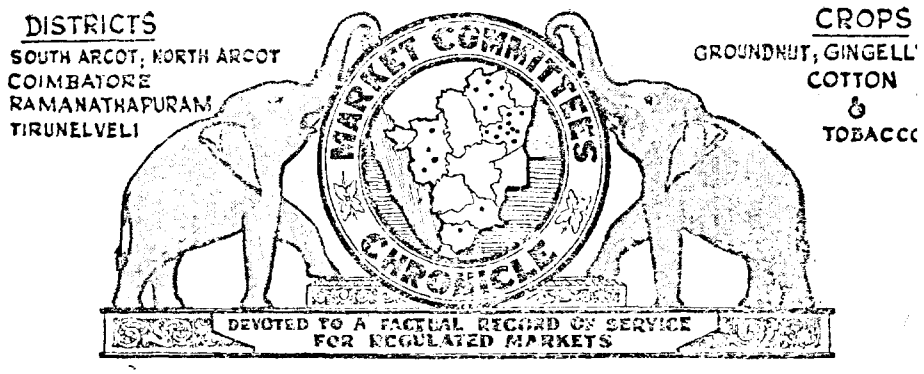
The State received either scattered or localised showers, practically throughout the month of September, 1961, except on six days, namely 5, 6, 13, 14, 17 and 28—9—61, when the State had mainly dry weather. The day temperatures were mainly normal throughout the period.

In regard to noteworthy rainfall, only Salem and Palur received respectively 3·74" and 3·08" of rain on 20—9—61 and 21—9—61. The zonal rainfalls are given hereunder:—

Zonal Rainfalls (in inches)

Name of the Zone	Rainfall for September, 1961 (inches)	Departure from normal	Remarks
North	7·5	+ 2·4	Above normal
East Coast	5·0	+ 0·6	Just above normal
Central	4·6	+ 1·4	Above normal
South	1·1	— 0·4	Below normal
Hills	4·9	— 0·3	Just below normal

From the Agricultural Meteorologist, A. C. & R. I., Coimbatore - 3.



Review of market conditions of commercial crops in the Madras State for the month of September 1961.

Cotton:

COIMBATORE DISTRICT: *Season:* Scarcity of water was felt in most parts of Udumalpet, Dharapuram and Palladam taluks of the district owing to absence of rain during the month. Pollachi, Palladam, Coimbatore and Avanashi taluks received some light showers. Sowing of cotton was delayed in many places for want of good showers. It has been done in parts of Pollachi, Avanashi and Coimbatore taluks where there are irrigation facilities. In these places where sowings have been done earlier with the available water supply, the condition of the crop is reported to be satisfactory.

Arrivals and Transactions: Kapas: The kapas market at Tiruppur had an opening stock of 19092 quintals of Cambodia and 788 quintals of Karunganni. The total arrivals were 34253 quintals of cambodia and 271 quintals of Karunganni kapas. The despatches during the month were 33277 quintals of cambodia and 678 quintals of Karunganni kapas leaving a stock of 20068 quintals of Cambodia and 381 quintals of Karunganni kapas.

Lint: The lint market at Tiruppur opened with 43,831 quintals of Cambodia and 417 quintals of Karunganni lint. The total arrivals into Tiruppur were 29258 quintals of Cambodia and 257 quintals of Karunganni lint which included 8714 quintals of Cambodia and 159 quintals of Karunganni lint locally ginned. Despatches from Tiruppur were 28648 quintals of cambodia and 453 quintals of Karunganni lint. At the end of the month there was a stock of 44451 quintals of Cambodia lint and 221 quintals of Karunganni lint. The prices of kapas and lint were Cambodia Kapas Rs. 133·07, Cambodia lint Rs. 326, Karunganni Kapas Rs. 99 per quintal.

RAMANATHAPURAM DISTRICT: The first fortnight witnessed hot sun and dry weather throughout the district. The second fortnight witnessed fairly good rains. The rainfall recorded at Virudhunagar amounted to 7·03 cms.

The arrivals and disposals of cotton kapas and lint during the month in Ramanathapuram district were Karunganni Kapas 45,900 quintals, Uganda Kapas 43,900 quintals, Karunganni lint 13,501 quintals and Uganda lint 11,261 quintals. The prices were, Karunganni kapas Rs. 93·33–97·33, Uganda 1st quality Rs. 113·33—130, Karunganni lint Rs. 252 and Uganda lint Rs. 300—330.

TIRUNELVELY DISTRICT: The rainfall recorded was about 20 m. m. during the month and it was considered beneficial since preparatory cultivation for the sowing of cotton was under way. The total arrivals and disposals of cotton in the several markets of the districts are as follows (in quintals).

		Opening Balance	Arrivals	Disposals	Closing Balance
Koilpatti					
Karunganni	kapas	17095	4800	6900	14995
	lint	1674	1925	2100	1499
Sankarankoil					
Uganda	kapas	17293	21640	18000	20933
	lint	3860	880	1300	3440

The prices of cotton kapas and lint were as follows:

Karunganni Kapas Ist sort.	Rs. 107	per quintal.
Uganda Kapas	Rs. 110 to 115	per quintal.

Groundnut:

SOUTH ARCOT DISTRICT: *Season:* Kallakurichi and Gingee received 15 and 12 inches of rainfall respectively. Vridhachalam, Panruti, Cuddalore, Tirukoilure, Chinnasalem and Ulundurpet received from 8 to 10 inches of rainfall each. Villupuram and Tindivanam recorded 5·5 and 6·7 inches of rainfall. The wide spread and good rains received during the month were beneficial generally to the standing groundnut and gingelly crops and helped controlling of caterpillar attack on groundnut crop.

Arrivals amounted to 96·60 tonnes. Despatches to other districts and States came to 5145 tonnes. A quantity of 3438 tonnes was crushed in oil mills and 379 tonnes in *chekkus*. The stock with the trade at the end of the month stood at 3275 tonnes. Prices declined slightly and average prices in the several markets ranged from Rs. 72·12 to 82·50 per bag of 80 kgs.

RAMANATHAPURAM DISTRICT: The arrivals and disposal of groundnut kernels in the district were 10,245 and 8000 quintals respectively. The following were the prices of groundnut and the groundnut products that prevailed during the month and previous month:

	Price per 80 kgs. August 1961	September 1961.
Groundnut Kernel	Rs. 75·00—96·66	Rs. 75·00—81·33
Pucca Katcha	Rs. 67·37—75·00	Rs. 62·00—78·33
	Price per 226·80 kgs.	
Groundnut oil	Rs. 443·57—482.14	Rs. 425.00—439·28
Groundnut oil cake	Rs. 79.39—82·53	Rs. 79·30—92·53

NORTH ARCOT DISTRICT: *Season:* The conditions continued to be favourable for winter crop groundnut in the districts. Fairly scattered rains were received throughout the district. The condition of standing crop of winter groundnut was satisfactory and the crop is expected to be taken up for harvest by middle of October in many parts of the district.

The arrivals and disposals of groundnut in the district were Groundnut pods (bags of 40 kgs.) 7450 and 5870 bags; Groundnut kernels (bags of 80 kgs.) 6376 and 4326 bags respectively. The prices ranged from Rs. 19 to 32 per bag of 40 kgs., Rs. 197 to 254 per bag of kernels 240 kgs. and groundnut oil (226 kgs.) Rs. 400 to 490.

TIRUCHIRAPALLI DISTRICT: *Season:* Heavy rainfall has been received in many parts of the district during the month. This has greatly benefitted the standing winter groundnut crop. The crop has been reported to de very good in many taluks.

The regulated market Jayamkondan has transacted 262 bags and Ariyalur 14 bags of 80 kgs. each of groundnut kernel. The prices of groundnut kernels ranged bstween Rs. 225 to 255 per candy of 240·85 bags.

Gingelly:

SOUTH ARCOT DISTRICT: Arrivals totalled to 2359 bags. Depatches to other districts amounted to 827 bags. The *chekkus* consumed 1562 bags. The trade had a stock of 665 bags at the end of the month. Prices declined and the average prices in the several markets varied from Rs. 71·50 to 84·04 per bags of 80 kgs.

Tobacco:

COIMBATORE DISTRICT: There was a stock of 40,188 quintals of chewing and 2900 quintals of cheroot tobacco. About 11,180 quintals of chewing tobacco and 650 quintals of cheroot tobacco were exported to places in North Arcot, Salem, Chingleput, South Arcot, Nilgiris and Madurai Districts in Madras State and Kerala, Mysore and Bombay States.

The tobacco market maintained a steady tone during the month. The pit cured variety in Palladam registered a further rise of Rs. 36 per quintal from Rs. 26/- due to demand from merchants of North Arcot and Chingleput Districts.

The prices for sun-cured chewing Tobacco (Meenampalayam) were from Rs. 177—250 for 1st grade per quintal. The cheroot varieties (sun-cured-grown in Erode and Bhavani taluks) ranged between Rs. 177—231 and chewing tobacco (pit cured) grown in Palladam and Sulur areas ranged between Rs. 250—297.

Cardamom:

There was good rainfall in the cardamom plantation areas in Madurai district as well as in Kerala Hills adjoining Madurai district. The condition of the standing crop of cardamom was good. Agricultural operations like weeding, spraying, picking and curing of the fruits were in progress. Prices ranged at Bodinaickanur from Rs. 7·83 to 8·11 for extra green.

Review of administrative activities of market committees in the Madras State during the month of September 1961

The Market Committees of South Arcot, North Arcot, Coimbatore, Trichy, Tirunelveli and Ramanathapuram continued to function during the month under report.

Enforcement:

Name of the Market Committees	Section 5 (1) A	Section 5 (1) B	Section 5 (3) A	Section 5 (3) B	Weighmen A	Weighmen B
South Arcot	207	2247	146	1487	131	1316
North Arcot	143	1446	134	1385	36	598
Coimbatore	248	1923	151	1386	23	587
Trichy	132	1738	126	1595	123	1405
Tirunelveli	24	245	3	99	19	228
Ramanathapuram	1	457	1	398	1	316

N. B.: A = Licences issued during the month.
B = Licenced issued upto the month.

Meetings :

The Fourth Ordinary meeting of the Trichirapalli Market Committee was held at its Central Office at Trichirapalli under the Presidentship of the Chairman Sri B. Venkatachalam Pillai on 9—9—1961 and in all 11 subjects were disposed of. Seven out of ten members were present at the meeting.

Other market committees did not meet during the month.

3. Quality analysis : Nil.
4. Quality competition : Nil.

OBITUARY.

We record with deep regret the sudden demise of Sri S. Ramachandran, retired Government Entomologist of the Madras State on the 24th October 1961 after a brief illness, at his residence in Coimbatore. He was born on 7th August 1897. Sri Ramachandran took his L. Ag. in the year 1919 and entered Government service as Agricultural Demonstrator and subsequently as Assistant in Entomology in the year 1920. He was promoted to the Madras Agricultural Service in 1935 and was in charge of the Sugarcane Insect Pests Scheme. Appointed as Government Entomologist in the year 1948 he was in full charge of Entomological developments in Madras State till 1952 when he retired from service.

In the field of Economic Entomology, he was the author of various papers on pests of many important crops and their control. He was a pioneer worker in Apiculture and his publication "Beekeeping in South India" is an outstanding one on the subject. He was a sociable and genial friend and a good conversationalist.

He is survived by his wife, a daughter and a son to all of whom we extend our heartfelt sympathies in their bereavement.

Departmental Notifications

Gazetted Officers—Madras Agricultural Department
Postings and Transfers during the month of October 1961

Name and Designation	Posted or Transferred to
Sri T. B. Krishnaswamy Rao, Research Assistant (Agronomy) Coimbatore-3.	Assistant Agronomist, Pilot Scheme, Kovilpatti
,, T. S. Muthukrishnan, Assistant Entomologist, Cuddalore	Lecturer in Entomology, Coimbatore-3.
Dr. A. R. Seshadri, Lecturer in Entomology, Coimbatore	Nematologist, A. C. & R. I., Coimbatore-3
Sri V. M. Kalyanaraman, Asst. in Entomology, Coimbatore	Asst. Entomologist, Coimbatore
,, K. C. Chandy, Lecturer in Zoology	Asst. Entomologist, Cuddalore
,, N. S. Loganathan, Asst. in Oilseeds	Asst. Oilseeds Specialist, Tindivanam
,, G. Purushothaman, Paddy Asst.	Supdt., A. R. S., Pattukottai.

Upper Subordinates—Agricultural Department
Postings and Transfers during the month of October 1961

Name and Designation	Posted or Transferred to
Sri T. V. Balasubramanian, Farm Manager, Bhavanisagar	Farm Manager, Coimbatore
,, I. P. Sridharan Nambiar, Agrl. Demonstrator, Chengam	,, ,, Bhavanisagar
,, V. K. Velayudhan,	Agrl. Extn. Officer, Kodavasal
,, S. K. Murugaiyan, Farm Manager, Bhavani	Farm Manager, State Seed Farm, Samathur
,, V. K. Nagarajan, Farm Manager, Samathur	A. D., Pandamangalam, Salem
,, S. S. Narayanan, Cotton Assistant, Koilpatti.	Cotton Asst., Coimbatore
,, P. K. Ramakrishnan, Assistant in Coordinated Manurial Trials Scheme, Pollachi	Cotton Asst., Koilpatti
,, A. Rajamani, Cotton Assistant Srivilliputhur	Certification Inspector, Tiruppur
,, V. M. Subash, Extn. Officer, Tirupur	Coconut Development Asst. Villupuram
,, S. Ramakrishnan, Coconut Development Asst. Villupuram	A. E. O., Tiruppur
,, P. Natchimuthu, A. E. O., Vyampatti	A. E. O., Kundadam

Name and Designation	Posted or Transferred to
Sri A. V. Raghavan, Agrl. Demonstrator, Madras	Special A. D. for Exhibition, Madras.
,, George Solomon, A. E. O., Melmalayanur	Agricultural Demonstrator, Madras
,, G. Bapin Bose, Agrl. Demonstrator, Sithalai	Marketing Asst., Tinnevelly
,, T. R. Rajaraman, A. E. O. Cumbum	Marketing Asst. (Cardamom) Madurai
,, P. T. Mathew	Nursery Asst. Attur
,, S. Subramaniya Iyer	A. E. O., Madurantakam, Chingleput Dist.
,, James Joseph	Plant Protection Asst., Kumbakonam
,, H. R. Madhavan	A. E. O., Udumalpet
,, A. Selvaraj Carvello, Information Asst., Madras	Plant Protection Assistant, Trichy
,, K. Gopalakrishnan	Asst. in Coordinated Manurial Scheme Coimbatore

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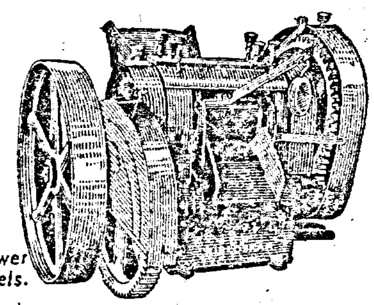

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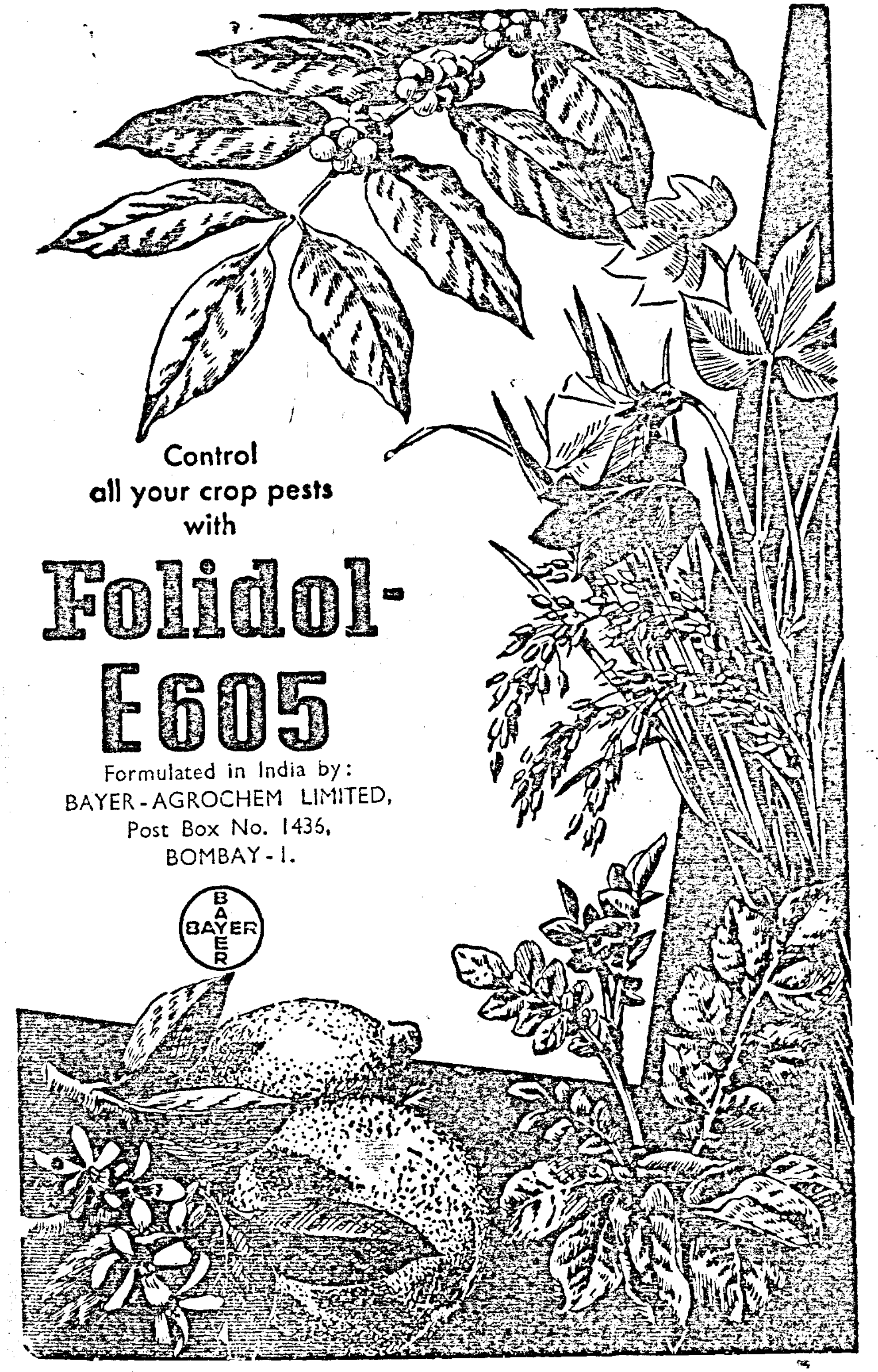

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தவணைத்தாள்.

சே எண் : ப. எண் :

வழங்கிய நாள். (1)	திரும்பிய நாள். (2)	வழங்கிய நாள். (1)	திரும்பிய நாள். (2)

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